# Leica Rugby 260SG / 270SG / 280DG User Manual

**Version 1.0**
**English**

- when it has to be **right**

Leica Geosystems

# Introduction

**Purchase**

Congratulations on the purchase of a Rugby instrument.

This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to "10 Safety Directions" for further information.
Read carefully through the User Manual before you switch on the product.

**Product identification**

The model and the serial number of your product are indicated on the type plate. Enter the model and serial number in your manual and always refer to this information when you need to contact your agency or Leica Geosystems authorized service workshop.

| | |
|---|---|
| Type-Serial No.: | 260-_____ |
| | 270-_____ |
| | 280-_____ |
| Date of purchase: | _____ |

**Symbols**

The symbols used in this manual have the following meanings:

| Type | Description |
|---|---|
| **Danger** | Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. |
| **Warning** | Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury. |
| **Caution** | Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury and/or appreciable material, financial and environmental damage. |
| | Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner. |

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# 1 Introduction

**General information**

This manual contains operating and setup procedures for common applications. Its purpose is to describe the features of the Rugby and how the Rugby operates. The manual is not intended to describe specific applications. Contact your local dealer or Leica Geosystems for information specific to your jobsite requirements.

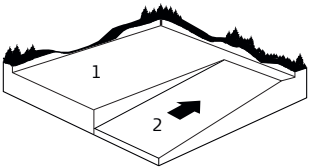
The Rugby grade laser is designed to serve your needs in a wide variety of applications.
It is a proven tool for increased production with substantial reduction of labour, time and material costs. It can be used to accurately control sloped or level grading, trenching, open cut mining, dredging, contouring of levees, general construction and excavation.

## Features

| Feature | Rugby 260SG | Rugby 270SG | Rugby 280DG |
|---|---|---|---|
| 90° Plumb beam | | | ✓ |
| Vertical operation | | | ✓ |
| RF remote control | | | ✓ |
| Dual grade to ± 15% | | | ✓ |
| Single grade to ± 15% | | ✓ | ✓ |
| Fully automated grade control | | ✓ | ✓ |
| Single grade to ± 10% (semi-automatic) | ✓ | ✓ | ✓ |
| Beam masking | ✓ | ✓ | ✓ |
| Bright, visible beam | ✓ | ✓ | ✓ |
| Large, intuitive, graphic display | ✓ | ✓ | ✓ |
| Simple, five-button operation | ✓ | ✓ | ✓ |

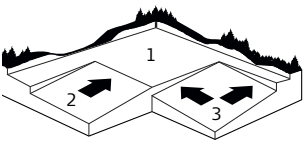
## Area of application

### Single grade




The **Rugby 260SG*** and **270SG** are single grade lasers and are capable of producing an accurate plane of laser light for applications which require level (1) or single slope (2).

### Dual grade




The **Rugby 280DG** is a dual grade laser and is capable of producing an accurate plane of laser light for applications that require level (1), single slope (2) or dual slope (3).

* The Rugby 260SG is fully automatic at level and manual at grade.

# 2 Features and Functions

## Overview

a) **POWER** button
b) **X/Y** button
c) **UP** button
d) **X** button (Rugby 260SG and 270SG only)
e) Easy grip handle
f) LCD display
g) **STAR** button
h) **DOWN** button
i) Charger input
j) Tripod mount

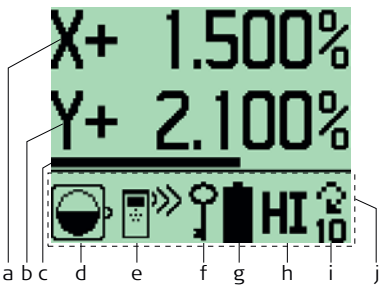
**Buttons**

| Button | | Function |
|---|---|---|
| | **POWER button** | Press shortly to switch the Rugby on or activate backlight.<br>Press and hold for 1.5 seconds to switch the Rugby off. |
| | **X button** | Press to set grade in the X-axis.<br>(Rugby 260SG and 270SG only)<br>Throughout this manual, the **X/Y** button will be used when referring to either the **X** or **X/Y** button. |
| | **X/Y button** | Press to set grade in the X- and Y-axis.<br>(Rugby 280DG only) |
| | **UP button** | After pressing **X/Y**, press to increase the grade shown. |
| | **DOWN button** | After pressing **X/Y**, press to decrease the grade shown. |
| | **STAR button** | Press to enter setup screens and the grade entry by digit screen. |

**Components**

| Component | Function |
|---|---|
| **LCD display** | Shows the grade setting for the X- and Y-axis. The display shows also beam masking, battery status, H.I. and head speed. |
| **Charger input** | For charging the batteries. |
| **Easy grip handle** | For carrying and setup. |
| **Tripod mount** | For attachment to a tripod with 5/8"-11 mounting thread. |

**Description: main screen**




a) X-axis grade
b) Y-axis grade
c) Progress bar
d) Beam masking
e) Remote status
f) Lock status
g) Battery status
h) H.I. alert
i) Head speed or scan status
j) Status line

# 3 Setup

## 3.1 General Setup

| | |
|---|---|
| **Location** | Make sure the location is clear of possible obstructions that may block or reflect the laser beam.<br>Make the most efficient use of the Rugby's operating radius. The Rugby can be placed in the center of the working area or to one side.<br>Make sure the ground is stable. Ground vibration and extremely windy conditions can affect the operation and accuracy of the Rugby.<br>If working in very dusty conditions, place the Rugby up-wind. The dirt will then be blown away from the Rugby and reduce interference. |
| **Recommended head speeds** | The typical head speed for general construction applications is 10 rps (600 rpm). When working at extended distances, decreasing the head speed (increasing the pulse time on the receiver) or changing the band width of the receiver to wide band can improve the laser range and performance. |
| **Tripod setup** | Attach the Rugby securely to a tripod or laser trailer, or mount it on a stable level surface.<br>Always check the tripod or trailer before beginning work.<br>Make sure all screws, bolts and nuts are tight.<br>If your tripod has chains, they should be slightly loose to allow for thermal expansion during the day. |

On extremely windy days, secure the tripod, for example, by placing a sandbag on each leg.
If using a tripod with a quick disconnect adapter, point the control lever into the wind. This places the locking mechanism also into the wind and will provide better stability.
To make use of the extended grade capability, make sure the Rugby is mounted on the tripod with the display directly over one leg.

## 3.2 Setup Options

**Description**

The Rugby has several setup options that are easily accessed and changed in the setup screen.

From the main screen, press the **STAR** button to access the setup screen.

Use the **UP** and **DOWN** buttons to move the cursor.

Use the **STAR** button to select the setup parameters.

Use the **UP** and **DOWN** buttons to change the selected parameter.

Press the **STAR** button to accept the change.

Select EXIT and press the **STAR** button to return to the main screen.

---

**Parameters**

Head speed and scan mode.

H.I. function: Turns the H.I. function on and off.

Automatic or manual mode.

Beam masking: Turns the beam off in the selected sectors.

Lock function: Protects the Rugby against unwanted changes.

☞ If no button is pressed, the display will revert to the main screen after ten seconds and stores possible changes.

**Head speeds**

- Rugby 260SG: fixed to 10 rps (600 rpm).
- Rugby 270SG: 5 or 10 rps (300 or 600 rpm).
- Rugby 280DG: 0, 2, 5 or 10 rps (0, 120, 300, 600 rpm) and additionally has the scan features scan 10, 45 or 90 degrees.

Select the head speed that provides the best performance for your application. The selected head speed is shown in the status line.

**Scan and 0 rps**

☞ The scan feature and head speed 0 rps is only available on a Rugby 280DG.

Scan can be selected in the same screen as head speeds.
Use the **UP** or **DOWN** buttons to select scan 10, 45 or 90 degrees.
Once selected the head will stop and scan in the selected area.
From the main menu press the **DOWN** button to rotate the head clockwise. Press **UP** to rotate counter-clockwise.
Pressing **UP** and **DOWN** at the same time will rotate the head in 90 degree increments.

**H.I. function**

The H.I. (**H**eight of **I**nstrument) function is used to alert for critical elevation changes caused by movement of the tripod.
When the H.I. function is turned on, the letters "HI" will appear in the status line. The H.I. function becomes active 30 seconds after the Rugby has completely leveled, the head starts rotating and the self-leveling accuracy remains the same.

The Rugby will trigger an H.I. alert if it has to re-level beyond the limit. The Rugby will stop rotating and the following screen will appear on the display:

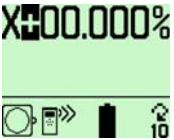
☞ Stop the alert condition by pressing the **STAR** or **POWER** button. In any case the Rugby relevels, sets the grade and re-activates the H.I. function.
Carefully check the setup and elevation of the Rugby to determine what has caused the alert condition.
Adjust as required to the correct elevation.

**Automatic mode**

The Rugby will always turn on in automatic mode and will continuously self-level to maintain grade accuracy.

To indicate automatic mode, the display shows:

The X-axis slope can be changed by pressing the **X/Y** button first and then the **STAR** button to enter the grade entry by digit screen. Refer also to chapter "4.2 Entering Grade".

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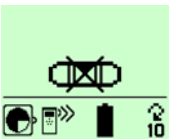
**Manual mode**

In manual mode the self-leveling function and the H.I. function are not available.

To indicate manual mode, the display shows:



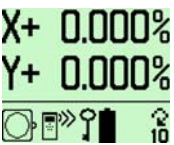
In manual mode the X-axis slope can be changed by pressing the **X/Y** button first and then the **UP** button / **DOWN** button to change the amount.
The amount of change is not visible on the display.

**Beam masking**

Electronic beam masking allows for turning off the laser beam in specific sectors to prevent interference with other operations on the job.
Using the setup menu the beam can be turned off in two or three selected sectors.
The beam masked sectors will appear dark.

**Lock function**

The lock function is used to prevent the Rugby against unwanted changes. When the lock function is activated, the Rugby remains operational, but no settings can be changed.




The lock status is shown in the status line.
Once activated and pushing a button, the lock symbol will be shown for three seconds.
To turn OFF the lock function, press the **STAR** button to return to the setup screen and disable the lock.

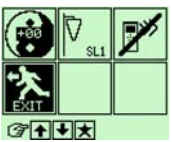
Even if the Rugby is locked, the backlight can be switched on by pressing the **POWER** button shortly.
Press and hold the **POWER** button to switch the Rugby OFF.

## 3.3 Additional Setup Options

**Description**

Additional setup options may be accessed in a second setup screen.

From the main screen, press and hold the **UP** button, then press the **STAR** button to access the second setup screen.




**Display contrast**

The display contrast of the Rugby can be adjusted.
The display contrast range goes from -8 (low) to +8 (high).

**Sensitivity**

The sensitivity setting allows the Rugby to operate in adverse environmental and windy conditions, while still ensuring maximum accuracy. The sensitivity can be set to Sensitivity Level SL1 or Sensitivity Level SL2.
Select "SL1" for normal conditions.
Select "SL2" for very adverse conditions.

---

**Remote function**

The remote function is enabled only when a remote is to be used with the Rugby. It is normally off to save battery power.

☞ Only the Rugby 280DG is remote capable and will show the remote function.

---

# 4 Operation

## 4.1 General

**Backlight**

Per default the backlight is always off.
To switch on the backlight, press the **POWER** button shortly.

**Settings**

All setup options are stored when the Rugby is turned off.

☞ On a Rugby 260SG, the H.I. function is active per default after power on. Refer to chapter "3.2 Setup Options" to see how the H.I. function can be turned off.

**Temperature compensation**

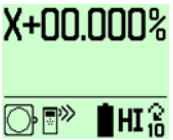
After the Rugby has been turned on, the temperature is measured. If the temperature changes by more than 5°C / 9°F it compensates and applies this change to the levelling system when grade has been entered.
The temperature compensation process is indicated by a progress bar (a).
During this process, head rotation stops and the laser beam is turned off.

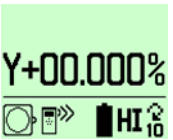
Once completed the Rugby returns back to the grade and the head starts to rotate.

## 4.2 Entering Grade

**Direct grade entry**

Press **X/Y** once to enter X-axis grade.
Press **X/Y** again to enter Y-axis grade. The display will show the grade entry screens.



Use the **UP** or **DOWN** buttons to set the desired grade.

Press **X/Y** to exit and store values.

**Grade entry by digit**

While in the grade entry screens, press the **STAR** button and a cursor will appear on the ± sign.

Press the **STAR** button to move the cursor to the right.

Press the **UP** or **DOWN** button to change the sign or the digit that is highlighted.

Press **X/Y** to exit and store values.

**Grade zero**

In grade entry mode, the grade in either axis can quickly be set to zero by pressing both the **UP** and **DOWN** buttons simultaneously.

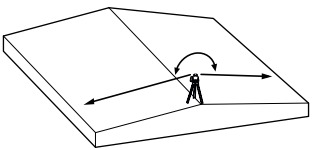
**Grade capability**

- Rugby 260SG: ±10% in one axis.
- Rugby 270SG: ±15% in one axis.
- Rugby 280DG: ±15% in both axes simultaneously.

On a Rugby 270SG / 280DG to reach more than 10% of grade the Rugby must be tilted towards the target plane.

**Grade swap**

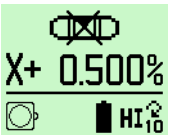
The grade values of an axis can easily be swapped from positive to negative in the grade entry by digit screen.



## 4.3 Rugby 260SG Used at Grade

**Description**

If the Rugby 260SG is used at grade it self-levels at the desired grade.
When the accurate grade value is reached, grade is locked and self-levelling turned off.




☞ As self-levelling is turned off, no compensation for any external setup and grade changes is applied.

However, if the Rugby is subsequently disturbed or knocked, the H.I. alert occurs, if active, to indicate sudden changes.

☞ The Rugby 270SG / 280DG are fully self-levelling lasers, hence will always self level at grade to compensate for any external setup and grade changes.

## 4.4 Lay Down Mode

☞ The lay down mode is only available on the Rugby 280DG.

**Typical applications**

Lay down of 90° angles, plumb (tilt-up walls) and transferring points from the floor to the ceiling.

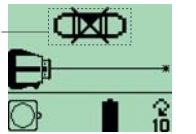
**Description**

In lay down mode the beam goes automatically to the beam down position (0 rps) so that the Rugby can be aligned over a reference point.

In automatic mode the vertical axis will self-level automatically, whereas this is not the case in manual mode.
The cross-axis can be adjusted left or right for layout applications.
If required, press the **STAR** button to change the setup options.

**Using lay down mode**

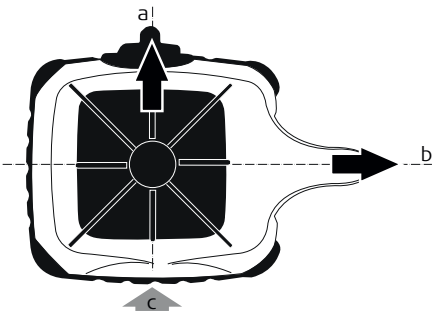
To activate lay down mode, put the Rugby into lay down position. The screen to the right is shown. Only in manual mode symbol a) is shown.
Set up the Rugby in the lay down position so that the laser beam is positioned over the first reference point.




Press the **UP** and **DOWN** buttons at the same time, and the beam will rotate clockwise to your second reference point on the right. (Press these two buttons two more times if your reference point is on the left side of the laser.)
In case that any setup option needs to be changed like head speed or scan mode, press the **STAR** button to enter the setup menu.
To align the cross-axis (or plumb beam) to a second reference point, press the **X/Y** button to select the cross-axis then press the **UP** or **DOWN** button to move the beam left or right.

## 4.5 Identification of the Axes

**Description**




a) **X+ axis**
When positive grade is entered in the X-axis, grade will increase in this direction.

b) **Y+ axis**
When positive grade is entered in the Y-axis, grade will increase in this direction.

c) **Front of Rugby**
See also axis labelling inside the top windows.

## 4.6 Slope - Percent of Grade

**Description**

- **Slope:**
  The change in elevation per unit of measure (foot, meter, etc.).
- **Percent of grade:**
  The change in elevation per 100 units of measure (feet, meters, etc.).

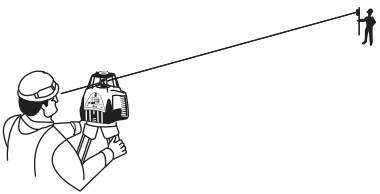
- **Calculating percent of grade from the slope:**

| | |
|---|---|
| Slope | = 0.0059 |
| Conversion | = 0.0059 x 100 |
| Percent of Grade | = 0.590% |

## 4.7 Alignment of the Axes

**Description**

When the desired grade is correctly set in the display, it is necessary to align the X and Y axes to the jobsite.



Ensure the Rugby is properly positioned over a control point.
As shown, the direction of the X-axis is seen from the front of the Rugby, sighting over the top.
Rotate the Rugby slightly until the sight-lines are aligned with your second control point.
Once aligned, work can begin.

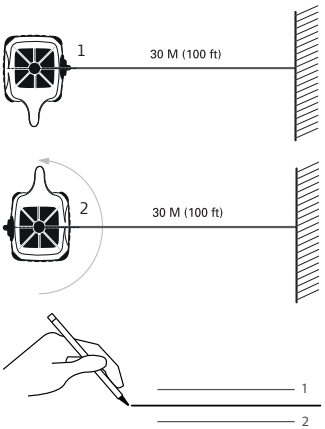
# 5 Checking Level Accuracy

- It is the responsibility of the user to follow operating instructions and to periodically check the accuracy of the instrument and work as it progresses.
- The Rugby is adjusted to the defined accuracy specification at the factory. It is recommended to check your Rugby for accuracy upon receipt and periodically thereafter to ensure accuracy is maintained. If your Rugby requires adjustment, contact your nearest authorized service center or adjust the Rugby using the following procedure.
- Do not enter this mode or attempt adjustment unless you plan to change the accuracy. Accuracy adjustment should be performed only by a qualified individual that understands basic adjustment principles.

## 5.1 Procedure

To check level accuracy of your Rugby, place the Rugby on a flat, level surface or tripod approximately 30 m (100 ft) from a wall.

**Checking the X-axis**




1. Align the X-axis so that it is perpendicular to the wall.
   Allow the Rugby to self-level completely, and then, using your Rod Eye receiver, mark the position of the beam (Position 1).
2. Rotate the Rugby 180°, allow it to self-level and then mark the opposite side of the X-axis (Position 2).
3. Mark the position half-way between the two marks.
   The X-axis is within its accuracy specification if the two marks are within ± 1/16" (± 1.5 mm) from center.

**Checking the Y-axis**

Align the Y-axis by rotating the Rugby 90° so that the Y-axis is now square to the wall. Allow the Rugby to self-level completely then check the Y-axis in the same way as described for checking the X-axis.

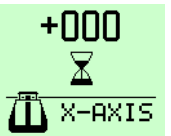
## 5.2 Adjusting Level Accuracy

**Enter adjustment mode**

With the Rugby turned off, press and hold both the **UP** and **DOWN** buttons then press the **POWER** button to put the Rugby in adjustment mode.

**X-axis accuracy adjustment**

Wait until the hour glass disappears before checking and changing the adjustment numbers.




Use the **UP** and **DOWN** buttons to change the number and move the beam to the half-way point between the positions marked for the X-axis.
5 counts in the display (one button press) are equal to approximately 0.3 mm at 30 m (0.01" at 100 ft).

Press the **STAR** button to accept the number in the display for the X-axis and move to the Y-axis adjustment screen.

**Y-axis accuracy**

Wait until the hour glass disappears before checking and changing the adjustment numbers.

Use the **UP** and **DOWN** buttons to change the number and move the beam to the half-way point between the positions marked for the Y-axis.

Press the **STAR** button to accept and store the number in the display for the Y-axis and to return to the main screen.

- After adjustment, always check your work.
- Always check accuracy prior to critical applications.
- Pressing the **POWER** button at any time before completing the procedure will cancel the adjustment and revert the accuracy to previously saved information.

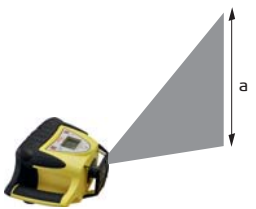
# 6 Checking Lay Down Accuracy

The lay down mode is only available on a Rugby 280DG.

## 6.1 Procedure

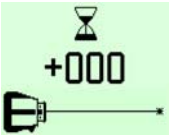
**Checking lay down accuracy**

1. To check lay down accuracy, place the Rugby 280DG on its side on a flat level surface 30 m (100 ft) from a wall so that the rotating beam projects a line on the wall.
2. Hang a plumb line on the wall.
3. If the rotating beam is not plumb, adjustment is necessary.



**Lay down accuracy adjustment**

1. With the Rugby still in lay down position, turn the Rugby off, then enter adjustment mode in the same way as described for adjusting level accuracy.




2. Have the rotating beam scan the plumb line then use the **UP** and **DOWN** buttons to align the beam vertically.

☞ Using the MR Remote Control will allow adjustment to be done remotely while closely monitoring the beam at the plumb line.

3. If desired adjustment is achieved, press the **STAR** button on the Rugby to accept and store the number on the display.

---

☞

- After adjustment, always check your work.
- Always check accuracy prior to critical applications.
- Pressing the **POWER** button at any time before completing the procedure will cancel the adjustment and revert the accuracy to previously saved information.

---

# 7 Accessories

## 7.1 Batteries

**Description**

**The battery solution** in the Rugby will accept a NiMH pack (b) or an alkaline battery pack (d).

a) Charger input
b) NiMH battery pack
c) Battery compartment locking nut
d) Alkaline battery pack

- The battery packs will fit into the bottom of the Rugby. Lock the battery pack in place using the large plastic nut.
- Individual D-cell batteries must be inserted into the alkaline battery pack. The silver tabs on the battery pack must be aligned with the tabs inside the base of the Rugby.

The charger input (a) is located on the the front of the Rugby. The NiMH battery pack can also be charged separately from the Rugby.
Charge time is approximately 8 hours.
The Rugby can be operated using the charger if the NiMH battery pack is inserted. (Indoor use only)

**Battery status**

The battery status is displayed as a small icon in the status line. Refer to "Description: main screen" on page 12.

**Low battery**

If the battery pack runs low on power, the low battery screen is shown. The Rugby will continue to operate but the head speed will switch to 7 rps to activate the RodMaster function on Rod Eye Receivers. The **STAR** button can be pressed to return to the previous settings.

☞ The Rugby may continue to operate for a few more hours if alkaline batteries are used. An empty battery icon in the status line will flash to indicate a low battery status.
If NiMH batteries are used, it's strongly recommended to fully recharge them as soon as possible in order to extend their lifetime.

| | |
|---|---|
| **Charging / First time use** | • The batteries must be charged prior to using it for the first time because it is delivered with an energy content as low as possible.<br>• The permissible temperature range for charging is between 0°C to +40°C (+32°F to +104°F). For optimal charging we recommend charging the batteries at a low ambient temperature of 0°C to +20°C (+32°F to +68°F) if possible.<br>• It is normal for the battery to become warm during charging. Using the chargers recommended by Leica Geosystems, it is not possible to charge the battery if the temperature is too high.<br>• For new batteries or batteries that have been stored for a long time ( > three months), it is effectual to make 3-5 charge/discharge cycles. |
| **Operation / discharging** | • The batteries can be operated from -20°C to +50°C (-4°F to +122°F).<br>• Low operating temperatures reduce the capacity that can be drawn; very high operating temperatures will reduce the service life of the battery. |

## 7.2 Remote Control

**Description**

The Rugby MR Remote Control is a full functioning, two-way remote control.

Only the Rugby 280DG supports use of the MR Remote Control.

All buttons on the remote except the **SLEEP** button have the same functionality as on the Rugby.

Before you can use the remote it is necessary to enable the remote capability on the Rugby. To do this, refer to "Remote function" on page 21.

**Remote symbol status**

The remote symbol will appear in the status line of the main screen of the Rugby.

Remote disabled.

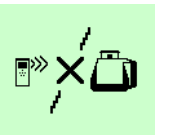
Remote enabled, but not connected.

Remote enabled and connected to Rugby.

**POWER button**

**The POWER button** turns on the remote. When pressed it will communicate with the Rugby to receive current information.
Once communication is established, the remote can be used to change grade and setup parameters on the Rugby 280DG.
Press and hold the **POWER** button for 1.5 seconds to turn the remote off.

If the remote is not within range or otherwise loses communication, the lost communication screen will be displayed.



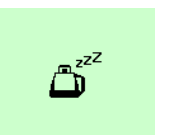
It is important to achieve the specified distances that the remote is used within the “line of sight” of the Rugby.

---

**STANDBY button**

**The STANDBY button** will cause the Rugby to go into standby mode for up to 16 hours. After this time the Rugby will shut off and can only be turned on again at the Rugby.

In standby mode, a sleeping Rugby is shown.



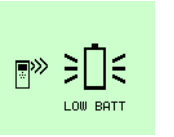
Pressing any button on the Rugby or on the remote (except the **POWER** button on the remote) will cause the Rugby to return to normal operation.

**Automatic shut off**

To save battery power, the remote will automatically shut off after two minutes of non-use.

**Low battery**

The remote will display a low battery screen when the batteries have reached a voltage where the remote can no longer communicate with the Rugby.

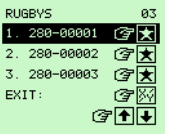



To replace the batteries, remove the bottom cover of the housing. Install as indicated on the side of the housing.

**Programming the remote**

☞ Make sure the remote is switched off prior to programming.

To program the remote to work with a specific Rugby, press and hold the **STAR** button then press the **POWER** button. The remote will search the immediate area for Rugby units with remote capability, and will identify these in the display.




To select your Rugby, highlight the serial number and press the **STAR** button. The remote will connect to the selected Rugby.
To exit this screen without changing settings, highlight **EXIT** and press the **X/Y** button.

**Shut-off timer**

The remote is set from the factory to shut off after two minutes of not being used. To change this shut-off time, enter the remote programming screen by pressing and holding the **STAR** button, then pressing the **POWER** button.

When the Rugby select screen is shown, press and hold the **STANDBY** button for 1.5 seconds. The shut-off time will change between 120, 60, or 30 seconds each time the button is held.

**Backlight**

The LCD backlighting is normally turned off to conserve battery power.

To backlight the display on the remote, press the **POWER** button a second time after the remote has been turned on.

**Remote reception**

The remote is an RF (radio frequency) device with an internal antenna. Always ensure that the remote is within the "line of sight" of the Rugby.

If the remote loses communication, hold the remote at a different angle to improve reception.

# 8 Troubleshooting

## 8.1 Screen Explanations

**General screens**

**Initial start-up screen**

- Leica logo and software version is shown.
- If service is required, please always provide the software version which is shown on the bottom line.

**Customer name screen**

- Can be programmed to display customer's name and address.
- Contact your dealer for more details.

**Standby mode**

- Controlled by the **STANDBY** button on the remote.
- Press the **POWER** button on the Rugby to turn off.
- Standby mode is only available on a Rugby 280DG if connected to an MR Remote Control.

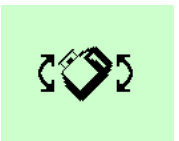
**Alert screens**

**H.I. alert**

- The Rugby has moved and elevation may have changed.
- Press the **POWER** or **STAR** button to reset **H.I.** function.
- Check Rugby's elevation and adjust if required.

**Servo limit**

- The Rugby cannot reach level or grade position.
- Tilt it in direction as indicated by the arrows.

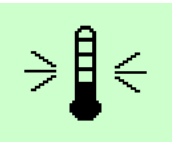


**Tilt**

- The Rugby is tilted at an angle of more than 20 degrees.

**Lock symbol**

- The Rugby is locked and does not allow any changes.
- Power on/off is still possible.
- To unlock, press the **STAR** button and go to the setup screen.



**Temperature**

- The Rugby is too hot or cold to operate properly.
- Shade the Rugby if too hot.
- Warm the Rugby before continuing if too cold.

**Lost communication**

- The remote is out of range. Move closer.
- The remote is not in the "line of sight" of the Rugby.

**Low battery**

- Shown if Rugby battery runs low on power.
- The head speed goes down to 7 rps to indicate low battery on the Rod Eye Pro receiver.
- Rechargeable batteries must be recharged as soon as possible.

**Vibration**

- The Rugby cannot level due to excessive vibration or wind.
- Tighten or sandbag your tripod, move the Rugby away from sources of vibration.
- Change sensitivity to 'SL2' for adverse conditions.
- Press the **STAR** button to restart levelling.

## 8.2 Troubleshooting Suggestions

**Description**

Whenever there are questions regarding your Rugby, check the basics first.

- Mode of operation: automatic or manual.
- Battery status.
- Alert screens: H.I., servo limit, temperature, adjustment.
- Head speed setting.
- Beam mask setting.

| Symptom | Possible causes and solutions |
|---|---|
| No beam | Check with a receiver to verify. |
| No self-leveling | Manual mode, set to automatic mode. |
| Cannot change grade | • Check the other axis.<br>• Check operation in manual mode.<br>• Check if at grade limit. |
| Loss of distance | • Check the window surfaces.<br>• Check with a different receiver.<br>• At extended distances, decreasing the head speed may improve performance. |
| Head rotates slowly | In low battery mode the Rugby will rotate slowly (7 rps) to trigger the laser low battery function on the Rod Eye Pro receiver. |

| Symptom | Possible causes and solutions |
|---|---|
| Grade stakes do not match the laser | • Check for proper alignment of the axes.<br>• Check level accuracy of the Rugby.<br>• Check the grade stakes to verify their accuracy or to determine if they have moved. |
| Remote will not turn on | Check and replace the batteries. |
| Remote will not communicate with the Rugby | • Check that remote capability is enabled on the Rugby. (See small icon on the main screen)<br>• Check remote battery status.<br>• Reduce distance and try again.<br>• At longer distances, ensure the remote is in the "line of sight" of the Rugby.<br>• Position the remote more upright to improve distance. |
| Setup options cannot be changed | • The Rugby is locked.<br>• Unlock the Rugby in the setup screen. |

☞ If none of the above suggestions results in a solution, contact your local dealer or nearest authorized service center.

# 9 Care and Transport

## 9.1 Transport

| | |
|---|---|
| **Transport in the field** | When transporting the product in the field, always make sure that you:<br>• Either carry the instrument in its original transport case<br>• Or carry the tripod with its legs splayed across your shoulder, keeping the attached instrument upright. |
| **Transport in a road vehicle** | Never carry the instrument loose in a road vehicle. It can be affected by shock and vibration. Always carry the product in its transport container and secure it. |
| **Shipping** | When transporting the product by rail, air or sea, always use the complete original Leica Geosystems packaging transport container and cardboard box, or its equivalent, to protect against shock and vibration. |
| **Shipping, transport of batteries** | When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping, contact your local passenger or freight transport company. |
| **Field adjustment** | After transport inspect the level accuracy in this user manual before using the product. |

## 9.2 Storage

**Product**

Respect the temperature limits when storing the product, particularly in summer if the instrument is inside a vehicle. Refer to "11 Technical Data" for information about temperature limits.

**Field adjustment**

After long periods of storage inspect the level accuracy given in this user manual before using the product.

**Nickel-Metal Hydride and D-Cell batteries**

- Refer to "11 Technical Data" for information about storage temperature range.
- Fully charged NiMH batteries can be stored for a maximum of 180 days. NiMH batteries must then be recharged again.
- Remove the batteries from the product for storage.
- After storage, recharge the batteries before use.
- Protect batteries from damp and wetness. Wet or damp batteries must be dried before storing or use.

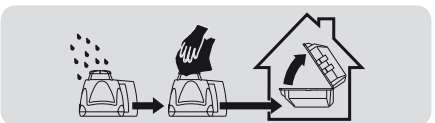
## 9.3 Cleaning and Drying

**Product and accessories**

- Blow dust off optical parts.
- Never touch the glass with your fingers.
- Use only a clean, soft, lint-free cloth for cleaning. If necessary, moisten the cloth with water or pure alcohol.
- Do not use other liquids; these may attack the polymer components.

**Damp Products**

- Dry the product, the transport container, the foam inserts and the accessories at a temperature not greater than 40°C / 104°F and clean them.
- Do not repack until everything is completely dry.
- Always close the transport container when using in the field.



**Cables and plugs**

- Keep plugs clean and dry.
- Blow away any dirt lodged in the plugs of the connecting cables.

# 10 Safety Directions

## 10.1 General

**Description**

The following directions should enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards.
The person responsible for the product must ensure that all users understand these directions and adhere to them.

## 10.2 Intended Use

**Permitted use**

- The product casts a horizontal laser plane or a laser beam for the purposes of alignment.
- The product can be set up on its own baseplate or on a tripod.
- The laser beam can be detected by means of a laser detector.
- Remote control of product.
- Data communication with external appliances.

**Adverse use**

- Use of the product without instruction.
- Use outside of the intended limits.
- Disabling safety systems.

- Removal of hazard notices.
- Opening the product using tools, for example screwdriver, unless this is specifically permitted for certain functions.
- Modification or conversion of the product.
- Use after misappropriation.
- Use of products with obviously recognizable damages or defects.
- Use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems.
- Inadequate safeguards at the construction site, for example when using on or near roads.
- Deliberate dazzling of third parties.
- Controlling of machines, moving objects or similar monitoring application without additional control and safety installations.

**⚠ Warning**

Adverse use can lead to injury, malfunction, and material damage.
It is the task of the person responsible for the equipment to inform the user about hazards and how to counteract them. The product is not to be used until the user has been instructed how to work with it.

## 10.3 Limits of Use

**Environment**

Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments.

**⚠ Danger**

Local safety authorities and safety experts must be contacted before working in hazardous areas, or in close proximity to electrical installations or similar situations by the person in charge of the product.

## 10.4 International Limited Warranty

**Description**

This product is subject to the terms and conditions set out in the International Limited Warranty which you can download from the Leica Geosystems home page at http://www.leica-geosystems.com/internationalwarranty or collect from your Leica Geosystems distributor.
The foregoing warranty is exclusive and is in lieu of all other warranties, terms or conditions, express or implied, either in fact or by operation of law, statutory or otherwise, including warranties, terms or conditions of merchantability, fitness for a particular purpose, satisfactory quality and non-infringement, all of which are expressly disclaimed.

## 10.5 Responsibilities

**Manufacturer of the product**

Leica Geosystems AG, CH-9435 Heerbrugg, hereinafter referred to as Leica Geosystems, is responsible for supplying the product, including the user manual and original accessories, in a completely safe condition.

**Manufacturers of non-Leica Geosystems accessories**

The manufacturers of non Leica Geosystems accessories for the product are responsible for developing, implementing and communicating safety concepts for their products, and are also responsible for the effectiveness of those safety concepts in combination with the Leica Geosystems product.

**Person in charge of the product**

The person in charge of the instrument has the following duties:

- To understand the safety instructions on the product and the instructions in the user manual.
- To be familiar with local regulations relating to accident prevention.
- To inform Leica Geosystems immediately if the product and the application becomes unsafe.
- To ensure that the national laws, regulations and conditions for the operation of radio transmitters are respected.

**Warning**

The person responsible for the product must ensure that it is used in accordance with the instructions. This person is also accountable for the training and the deployment of personnel who use the product and for the safety of the equipment in use.

## 10.6 Hazards of Use

**Warning**

The absence of instruction, or the inadequate imparting of instruction, can lead to incorrect or adverse use, and can give rise to accidents with far-reaching human, material, financial, and environmental consequences.
**Precautions:**
All users must follow the safety directions given by the manufacturer and the directions of the person responsible for the product.

**Caution**

Watch out for erroneous measurements if the product has been dropped or has been misused, modified, stored for long periods or transported.
**Precautions:**
Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the instrument has been subjected to abnormal use and before and after important measurements.

**⚠ Danger**

Because of the risk of electrocution, it is very dangerous to use grade rods and staffs in the vicinity of electrical installations such as power cables or electrical railways.
**Precautions:**
Keep at a safe distance from electrical installations. If it is essential to work in this environment, first contact the safety authorities responsible for the electrical installations and follow their instructions.

---

**⚠ Warning**

If the product is used with accessories, for example masts, staffs, poles, you may increase the risk of being struck by lightning.
**Precautions:**
Do not use the product in a thunderstorm.

---

**⚠ Warning**

Inadequate securing of the work site can lead to dangerous situations, for example in traffic, on building sites, and at industrial installations.
**Precautions:**
Always ensure that the work site is adequately secured. Adhere to the regulations governing accident prevention and road traffic.

---

**⚠ Caution**

If the accessories used with the product are not properly secured and the product is subjected to mechanical shock, for example blows or falling, the product may be damaged or people may sustain injury.

**Precautions:**

When setting up the product, make sure that the accessories, for example tripod, tribrach, connecting cables, are correctly adapted, fitted, secured, and locked in position.

Avoid subjecting the equipment to mechanical stress.

---

**⚠ Caution**

During the transport, shipping or disposal of batteries it is possible for inappropriate mechanical influences to constitute a fire hazard.

**Precautions:**

Before shipping the product or disposing of it, discharge the batteries by running the product until they are flat.

When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping contact your local passenger or freight transport company.

---

**Warning**

During dynamic applications, there is a danger of accidents occurring if the user does not pay attention to the environmental conditions around, for example obstacles, excavations or traffic.

**Precautions:**

The person responsible for the product must make all users fully aware of the existing dangers.

---

**Danger**

**Operation of Charger:**

The charger is not designed for use under wet and severe conditions.
If unit becomes wet it may cause you to receive an electric shock.

**Precautions:**

Use the charger only in dry environments, for example in buildings or vehicles. Protect the product against humidity. If the charger becomes humid, it must not be used!

---

**Warning**

**Operation of Charger:**
If you open the product, either of the following actions may cause you to receive an electric shock:

- Touching live components
- Using the product after incorrect attempts were made to carry out repairs.

**Precautions:**
Do not open the product. Only Leica Geosystems authorized service workshops are entitled to repair these products.

---

**Warning**

Batteries not recommended by Leica Geosystems may be damaged if charged or discharged. They may burn and explode.
**Precautions:**
Only charge and discharge batteries recomended by Leica Geosystems.

---

**Warning**

If the product is improperly disposed of, the following can happen:

- If polymer parts are burnt, poisonous gases are produced which may impair health.
- If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion or environmental contamination.
- By disposing of the product irresponsibly you may enable unauthorized persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

**Precautions:**

The product must not be disposed with household waste.
Dispose of the product appropriately in accordance with the national regulations in force in your country.
Always prevent access to the product by unauthorized personnel.

Product specific treatment and waste management information can be downloaded from the Leica Geosystems home page at http://www.leica-geosystems.com/treatment or received from your Leica Geosystems dealer.

---

**Warning**

Only Leica Geosystems authorized service workshops are entitled to repair these products.

---

**Warning**

Using a battery charger not recommended by Leica Geosystems can destroy the batteries. This can cause fire or explosions.
**Precautions:**
Only use chargers recommended by Leica Geosystems to charge the batteries.

**Warning**

High mechanical stress, high ambient temperatures or immersion into fluids can cause leakage, fire or explosions of the batteries.
**Precautions:**
Protect the batteries from mechanical influences and high ambient temperatures. Do not drop or immerse batteries into fluids.

**Warning**

Short circuited battery terminals can overheat and cause injury or fire, for example by storing or transporting in pockets if battery terminals come in contact with jewelry, keys, metallized paper or other metals.
**Precautions:**
Make sure that the battery terminals do not come into contact with metallic objects.

## 10.7 Laser Classification

**Description**

The following directions (in accordance with the statement of the art - international standard IEC 60825-1 (2007-03) and IEC TR 60825-14 (2004-02)) provide instruction and training information to the person responsible for the product and the person who actually uses the equipment, to anticipate and avoid operational hazards.
The person responsible for the product must ensure that all users understand these directions and adhere to them.

Product classified as laser class 1, class 2 and class 3R do not require:

- Laser safety officer involvement
- Protective clothes and eyewear
- Special warning signs in the laser working area

if used and operated as defined in this user manual due to the low eye hazard level.

Products classified as laser class 2 or 3R may cause dazzle, flash-blindness and afterimages, particularly under low ambient light conditions.

## 10.7.1 Rugby 260SG / 270SG

**Description**

The rotating laser produces a visible red laser beam which emerges from the rotating head.
The laser product described in this section, is classified as laser class 2 in accordance with

- IEC 60825-1 (2007-03): “Safety of laser products”
- EN 60825-1 (2007-10): “Safety of laser products”

Class 2 laser products are safe for momentary exposures but can be hazardous for deliberate staring into the beam.

**Rugby 260SG**

| Description | Value |
|---|---|
| Maximum peak radiant power | 2.7 mW ± 5% |
| Pulse duration (effective) | 1.1 ms |
| Pulse repetition frequency | 10 rps |
| Beam divergence | < 1.5 mrad |
| Wavelength | 635 ± 10 nm |

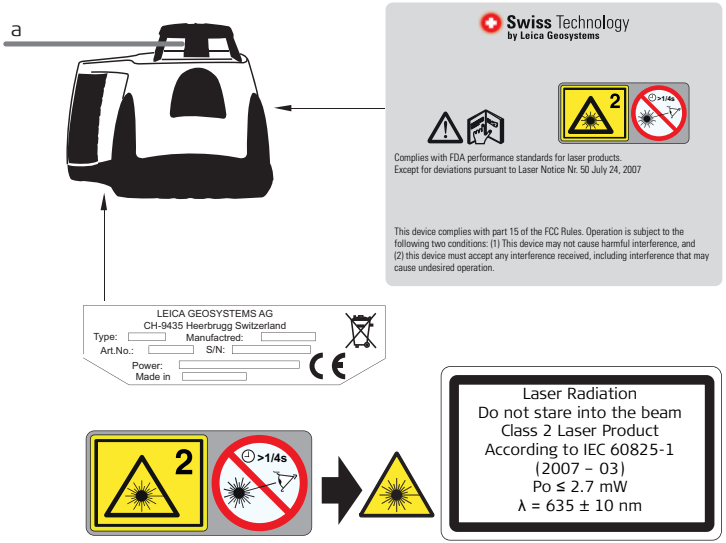
**Rugby 270SG**

| Description | Value |
|---|---|
| Maximum peak radiant power | 2.7 mW ± 5% |
| Pulse duration (effective) | 2.2, 1.1 ms |
| Pulse repetition frequency | 5, 10 rps |
| Beam divergence | < 1.5 mrad |
| Wavelength | 635 ± 10 nm |

**⚠ Warning**

From a safety perspective class 2 laser products are not inherently safe for the eyes.
**Precautions:**
Avoid staring into the beam.

## Labelling




a) Laser beam

## 10.7.2 Rugby 280DG

**Description**

The rotating laser produces a visible red laser beam which emerges from the rotating head.
The laser product described in this section, is classified as laser class 3R in accordance with:

- IEC 60825-1 (2007-03): “Safety of laser products”
- EN 60825-1 (2007-10): “Safety of laser products”

Class 3R laser products:
Viewing into the laser beam may be hazardous (Low-level eye hazard). In particular for ocular exposure. The risk of injury for laser class 3R products is limited because of:

- Unintentional exposure would rarely reflect worst case conditions of (e.g.) beam alignment with the pupil, worst case accommodation.
- Inherent safety margin in the maximum permissible exposure to laser radiation (MPE).
- Natural aversion behaviour for exposure to bright light for the case of visible radiation.

The Rugby 280DG is a class 3R product when used with head speed 0 rps (stationary mode) and a class 2 product when rotating or in scan mode.

| Description | Value |
|---|---|
| Maximum peak radiant power | 2.7 mW ± 5% |
| Pulse duration (Effective) | 5.0, 2.1, 1.0 ms |
| Pulse repetition frequency | 0, 2, 5, 10 rps |
| Beam divergence | < 1.5 mrad |
| Wavelength | 635 ± 10 nm |

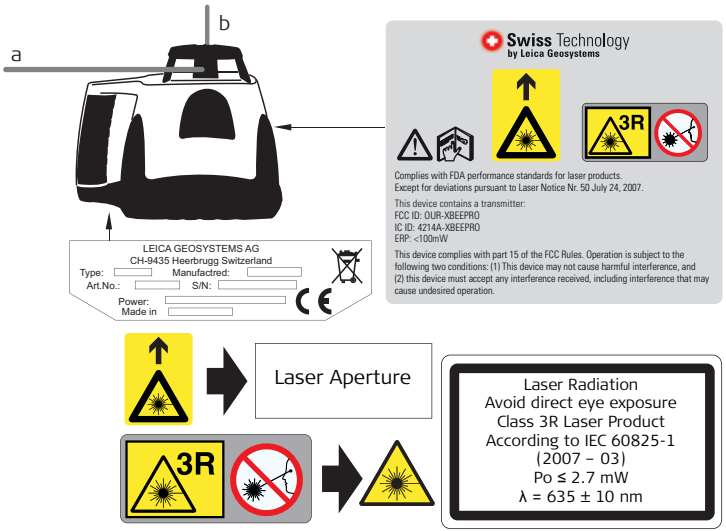
**Warning**

From a safety perspective class 3R laser products should be treated as potential hazardous.
**Precautions:**
Prevent direct eye exposure to the beam. Do not direct the beam at other people.

**Warning**

Potential hazards are not only related to direct beams but also to reflected beams aimed at reflecting surfaces such as prisms, windows, mirrors, metallic surfaces, etc.
**Precautions:**
Do not aim at areas that are essentially reflective, such as a mirror, or which could emit unwanted reflections.
Do not look through or beside the optical sight at prisms or reflecting objects when the laser is switched on, in laserpointer or distance measurement mode. Aiming at prisms is only permitted when looking through the telescope.

## Labelling




a) Laser beam
b) Plumb beam

## 10.8 Electromagnetic Compatibility (EMC)

**Description**

The term Electromagnetic Compatibility is taken to mean the capability of the product to function smoothly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic disturbances to other equipment.

**Warning**

Electromagnetic radiation can cause disturbances in other equipment.
Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed.

**Caution**

There is a risk that disturbances may be caused in other equipment if the product is used in conjunction with accessories from other manufacturers, for example field computers, personal computers, two-way radios, non-standard cables or external batteries.
**Precautions:**
Use only the equipment and accessories recommended by Leica Geosystems. When combined with the product, they meet the strict requirements stipulated by the guidelines and standards. When using computers and two-way radios, pay attention to the information about electromagnetic compatibility provided by the manufacturer.

**⚠ Caution**

Disturbances caused by electromagnetic radiation can result in errorneous measurements.
Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that the product may be disturbed by very intense electromagnetic radiation, for example near radio transmitters, two-way radios or diesel generators.
**Precautions:**
Check the plausibility of results obtained under these conditions.

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**⚠ Warning**

If the product is operated with connecting cables attached at only one of their two ends, for example external supply cables, interface cables, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.
**Precautions:**
While the product is in use, connecting cables, for example product to external battery, product to computer, must be connected at both ends.

---

**⚠ Warning**

**Use of product with radio devices:**
Electromagnetic radiation can cause disturbances in other equipment, in installations, in medical devices for example pacemakers or hearing aids and in aircraft. It can also affect humans and animals.
**Precautions:**
Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed or that humans or animals may be affected.

- Do not operate the product with radio devices in the vicinity of filling stations or chemical installations, or in other areas where an explosion hazard exists.
- Do not operate the product with radio devices near to medical equipment.
- Do not operate the product with radio devices in aircraft.
- Do not operate the product with radio devices for long periods with it immediately next to your body.

## 10.9 FCC Statement, Applicable in U.S.

**Warning**

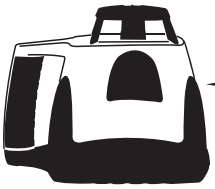
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules.
These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses and can radiate frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.
However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

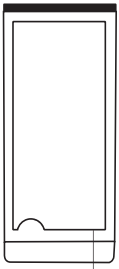
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

**Warning**

Changes or modifications not expressly approved by Leica Geosystems for compliance could void the user's authority to operate the equipment.

## Labelling Rugby 260SG / 270SG / 280DG and MR Remote Control





Swiss Technology
by Leica Geosystems

Complies with FDA performance standards for laser products.
Except for deviations pursuant to Laser Notice Nr. 50 July 24, 2007.

This device contains a transmitter:
FCC ID: OUR-XBEEPRO
IC ID: 4214A-XBEEPRO
ERP: <100mW

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Swiss Technology
by Leica Geosystems

***Type:*** **RF MR**
Art.No.: 768543

Power: 5V ⎓ nominal / 350mA max.

Leica Geosystems AG
CH-9435 Heerbrugg
Manufactured: 2009

Made in Singapore

This device contains a transmitter
FCC ID: RFD-RFLRRC
IC ID:3177A-RFRC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

**Conformity to National Regulations**

- FCC Part 15 (applicable in US).
- Hereby, Leica Geosystems AG, declares that the product Rugby 260SG / 270SG / 280DG and MR Remote Control is in compliance with the essential requirements and other relevant provisions of the applicable Europe Directive. The declaration of conformity may be consulted at http://www.leica-geosystems.com/ce.
- Rugby 280DG and MR Remote Control.

Class 2 equipment according European Directive 1999/5/EC (R&TTE) for which following EEA Member States apply restrictions on the placing on the market or on the putting into service or require authorization for use:

- France
- Italy
- Norway (if used in the geographical area within a radius of 20km from the centre of Ny-Ålesund)

- The conformity for countries with other national regulations not covered by the FCC part 15 or European directive 1999/5/EC has to be approved prior to use and operation.

| | |
|---|---|
| Frequency range: | 2405-2480 MHz |
| Transmission power: | < 100 mW (e.i.r.p.) |

**Antenna**

| | |
|---|---|
| Rugby 280DG: | Whip antenna |
| MR Remote Control: | Chip antenna |

**Specific Absorption Rate (SAR)**

The product meets the limits for the maximum permissible exposure of the guidelines and standards, which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 cm should be kept between the antenna and the body of the user or nearby person within the intended application.

# 11 Technical Data

**Rugby 260SG / 270SG / 280DG**

| Description | Value |
|---|---|
| Horizontal self-leveling accuracy* | 1.5 mm at 30 m (±1/16 inch at 100 ft) |
| Grade accuracy | 3.0 mm at 30 m (±1/8 inch at 100 ft) |
| Self-leveling range | ± 5° |
| Laser diode type | 635 nm (visible red laser) |
| Operating temperature | -20° to +50°C (-4° to +122°F) |
| Storage temperature (without batteries) | -40° to +70°C (-40° to +158°F) |
| Battery life** | 70 hours (4 alkaline),<br>40 hours (NiMH pack) |
| Charging time | 8 hours (approximately) |
| Dimensions (HWD) | 197 x 248 x 175 mm (7.8 x 9.8 x 6.9") |
| Weight with batteries | 2.95 kg (6.5 lbs.) |
| Environmental | Waterproof to IP67 Standard |

* Accuracy defined at +25°C / +77°F.
** Battery life is dependent on many variables.

**Rugby 260SG specific**

| Description | Value |
|---|---|
| Grade capability (X-axis) | -10% to +10% |
| Operating range*** | 300 m (985 ft) radius |
| Head speed | 10 rps (600 rpm) |
| Laser classification | Class 2 IEC60825-1 |

*** Tested with Leica receivers.

**Rugby 270SG specific**

| Description | Value |
|---|---|
| Grade capability (X-axis) | -15% to +15% |
| Operating range*** | 350 m (1150 ft) radius |
| Head speed | 5 or 10 rps (300 or 600 rpm) |
| Laser classification | Class 2 IEC60825-1 |

*** Tested with Leica receivers.

**Rugby 280DG specific**

| Description | Value |
|---|---|
| Grade capability | -15% to +15% in either axis simultaneously |
| Operating range:<br>• rotating beam***<br>• plumb beam (visible) | <br>350 m (1150 ft) radius<br>up to 60 m (200 ft) |
| Scan mode | 10°, 45° and 90° |
| Scan feature | Scan 90° |
| Head speed | 0, 2, 5 or 10 rps (0, 120, 300, 600 rpm) |
| Remote capability | Rugby MR Remote Control |
| Lay down mode | for special construction applications |
| Laser classification | Class 3R IEC60825-1 |

*** Tested with Leica receivers.

**Rugby MR Remote Control**

| Description | Value |
|---|---|
| Distance**** | 100 m (330 ft) typical radius |
| Battery type | 4 AAA-alkaline batteries |
| Dimensions (HWD) | 155 x 70 x 45 mm (6.1 x 2.8 x 1.8") |
| Weight | 410 g (14.4 oz.) |
| Environmental | Waterproof to IP54 Standard |

**** The remote control distance may be decreased by LAN / WIFI networks used nearby.

**Total Quality Management: Our commitment to total customer satisfaction.**

Leica Geosystems AG, Heerbrugg, Switzerland, has been certified as being equipped with a quality system which meets the International Standards of Quality Management and Quality Systems (ISO standard 9001) and Environmental Management Systems (ISO standard 14001).

**Ask your local Leica Geosystems dealer for more information about our TQM program.**

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**www.leica-geosystems.com**

- when it has to be **right**

Leica Geosystems